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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/687,326	10/16/2003	Robert Cronch	STL11150	8509
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TOLER SCHAFFER, LLP 8500 BLUFFSTONE COVE SUITE A201 AUSTIN, TX 78759			EXAMINER CONTINO, PAUL F	
			ART UNIT 2114	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/687,326

Applicant(s)

CRONCH, ROBERT

Examiner

Paul Contino

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☒ Claim(s) 15-26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

Detailed Action: Non-Final Rejection

Specification

1. The disclosure is objected to because of the following informalities: page 19 line 5 states “= the control” where “=” appears to be a mistake.

Appropriate correction is required.

Claim Objections

2. Claim 13 is objected to because of the following informalities: line 3 should end in a “;”.
Appropriate correction is required.

3. Claim 22 is objected to because of the following informalities: the last line of the claim would be more appropriately stated as “steps (g-i).” in order to ensure that one reading the claim would be directed to the specified steps. Appropriate correction is required.

4. Claim 25 is objected to because of the following informalities: the second to the last line of the claim would be more appropriately stated as “steps (g-h)” in order to ensure that one reading the claim would be directed to the specified steps. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-5, 13, and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Nelson et al. (U.S. Patent No. 5,666,512).

As in claim 1, Nelson et al. discloses a data storage system comprising:

a storage media for storing data (*Fig. 1 #11; column 3 lines 16-22, disk array 11*);

a controller configured to determine an amount of free space available on the storage media, and to select a method of generating additional error correction information for data stored on the storage media based upon the determined amount of free space on the storage media (*Fig. 1; column 6 lines 51-61 and column 8 lines 1-8; where depending on the amount of free space available, data may be migrated from mirror storage to parity storage, where additional error correction information in the form of parity is generated when migration occurs; column 3 lines 16-22 discloses controllers 14a, 14b, and 16, which independently each are a controller, and together as one are a controller*).

As in claim 2, Nelson et al. discloses the controller is further configured to generate the additional error correction information for data stored on the storage media according to the selected method (*column 3 lines 16-22, column 6 lines 51-61, and column 8 lines 1-8*).

As in claim 3, Nelson et al. discloses the controller further comprises:

a first controller component (*Fig. 1; column 4 lines 30-49, where controller 14a/14b/16 has a first controller component 14a*); and

a second controller component (*Fig. 1; column 4 lines 30-49, where controller 14a/14b/16 has a first controller component 21a*).

As in claim 4, Nelson et al. discloses the controller is configured to select one of a plurality of methods of error correction information based on whether the amount of free space on the storage media meets a predetermined threshold level (*column 9 lines 18-38, where the amount of parity error correction information is dependent upon an unused space threshold*).

As in claim 5, Nelson et al. discloses if the amount of free space is greater than or equal to a first threshold value of the capacity of the storage media, the controller is configured to store a mirror copy of the data on the free space of the storage media (*column 9 lines 18-23 and column 12 lines 14-24*).

As in claim 13, Nelson et al. discloses a method of storing data on a storage media comprising the steps of:

1) receiving data at a storage device containing the storage media (*Fig. 1 #11; column 3 lines 16-22, disk array 11*);

2) adding error correction code to the received data (*column 5 lines 36-41, where the parity data is added in conjunction with received data for error protection*);

3) generating additional error correction information based upon an amount of free space on the storage media (*Fig. 1; column 6 lines 51-61 and column 8 lines 1-8; where depending on the amount of free space available, data may be migrated from mirror storage to parity storage, where additional error correction information in the form of parity is generated when migration occurs; column 3 lines 16-22 discloses controllers 14a, 14b, and 16, which independently each are a controller, and together as one are a controller*);

4) storing the data on the storage media (*column 3 lines 16-22, column 6 lines 51-61, and column 8 lines 1-8*); and

5) storing the generated additional error correction information on the storage media (*column 3 lines 16-22, column 6 lines 51-61, and column 8 lines 1-8*).

As in claim 14, Nelson et al. discloses generating error correction information further comprises the steps of:

selecting one of a plurality of methods for generating error correction information based upon the amount of free space on the storage media (*column 6 lines 51-61, column 8 lines 1-8, and columns 9 and 10, where the different types of migration describe different methods of generation of parity error correction information*); and

generating the error correction information based on the selected method (*column 6 lines 51-61 and column 8 lines 1-8*).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson et al. in view of DeKoning et al. (U.S. Patent No. 5,790,773).

As in claim 6, Nelson et al. teaches of a controller and storing a mirror copy of data. However, Nelson et al. fails to teach of storing a mirror copy of data as a compressed version of the data. DeKoning et al. teaches of mirrored data compression (*column 6 lines 11-16*).

It would have been obvious to a person skilled in the art at the time the invention was made to have included the compression as taught by DeKoning et al. in the invention of Nelson et al. This would have been obvious because compression of mirrored data reduces the amount of storage devices needed for storing of data (*column 6 lines 11-16*).

* * *

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson et al. in view of Malan et al. (U.S. Patent No. 5,519,849).

As in claim 7, Nelson et al. teaches of free space and a threshold, including error correction information. However, Nelson fails to teach of the error correction information being a Reed/Solomon code. Malan et al. teaches of a Reed/Solomon error correction code (*column 1 lines 46-49*).

It would have been obvious to have included the Reed/Solomon code as taught by Malan et al. in the invention of Nelson et al. This would have been obvious because using a Reed/Solomon code is well-known means of including fault tolerance in a parity/RAID environment (*column 1 lines 46-49*).

* * *

8. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson et al. in view of Official Notice.

As in claim 8, Nelson et al. teaches of a storage media with at least one disk, where the controller stores the data on the at least one disk. However, Nelson et al. fails to teach of sectors. The Examiner is taking Official Notice that it would have been obvious to a person skilled in the

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art at the time the invention was made to have included sectors, and storing of data on sectors, in the invention of Nelson et al. This would have been obvious because it is well-established in the art to address storage media at a "sector" level.

* * *

9. Claims 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson et al. in view of Official Notice, further in view of Talagala et al. (U.S. Patent No. 6,880,060).

As in claim 9, the combined invention of Nelson et al. and Official Notice teaches determining free space and of sectors, including selecting error correction based upon the free space. However, the combined invention of Nelson et al. and Official Notice fails to teach of determining unused space on a sector. Talagala et al. teaches of determining unused space on a sector and including error correction information based upon the unused amount of sector space (*column 3 lines 4-9 and column 6 lines 43-48, where integrity data is error correction information*).

It would have been obvious to a person skilled in the art at the time the invention was made to have included the unused sector space determination as taught by Talagala et al. in the combined invention of Nelson et al. and Official Notice. This would have been obvious because the storage means taught by Talagala et al. allows for efficient utilization of storage while retaining a fault tolerant environment.

As in claim 11, Talagala et al. teaches a controller is configured to write the location of the error correction information for each the sectors to a redundancy table (*Fig. 5; column 6 lines 27-51, where the data map represents a redundancy table*).

* * *

10. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson et al. in view of Official Notice, further in view of Talagala et al., further in view of Fung et al. (U.S. Patent No. 7,133,228).

The applied reference Fung et al. has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome

by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(I)(1) and § 706.02(I)(2).

As in claim 10, the combined invention of Nelson et al., Official Notice, and Talagala et al. teaches of a controller and additional error correction information. However, the combined invention of Nelson et al., Official Notice, and Talagala et al. fails to teach of data compression and inclusion of error correction information with data in a sector. Fung et al. teaches of compressing data on a sector and including error correction information for the data in the sector using the additional space generated by data compression (*Fig. 3; column 6 line 65 through column 7 line 6*).

It would have been obvious to a person skilled in the art at the time the invention was made to have included the compression and error correction information storage as taught by Fung et al. in the combined invention of Nelson et al., Official Notice, and Talagala et al. This would have been obvious because compression of data and storage of error correction information with the data increases overall storage capacity while including fault tolerance for the data (*column 4 lines 61-64*).

* * *

11. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson et al. in view of Official Notice, further in view of Talagala et al., further in view of DeKoning et al., further in view of Malan et al.

As in claim 12, the combined invention of Nelson et al., Official Notice, and Talagala et al. teaches of a controller and storing a mirror copy of data. However, the combined invention of Nelson et al., Official Notice, and Talagala et al. fails to teach of storing a mirror copy of data as a compressed version of the data or of Reed/Solomon error correction coding. DeKoning et al. teaches of mirrored data compression (*column 6 lines 11-16*). Malan et al. teaches of a Reed/Solomon error correction code (*column 1 lines 46-49*).

It would have been obvious to a person skilled in the art at the time the invention was made to have included the compression as taught by DeKoning et al. in the combined invention of Nelson et al., Official Notice, and Talagala et al. This would have been obvious because compression of mirrored data reduces the amount of storage devices needed for storing of data (*column 6 lines 11-16*).

It would have been obvious to have included the Reed/Solomon code as taught by Malan et al. in the combined invention of Nelson et al., Official Notice, Talagala et al., and DeKoning et al. This would have been obvious because using a Reed/Solomon code is well-known means of including fault tolerance in a parity/RAID environment (*column 1 lines 46-49*).

Allowable Subject Matter

12. Claims 15-26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

As in claim 15, the limitations of **comparing the calculated amount of free space against a plurality of threshold values ... corresponding to an amount of free space on the storage media, and executing the method of error correction information for the identified threshold value**, when read within the remainder of the limitations of the claim, including base claim 14, makes claim 15 allowable over the prior art. Claims 16-26 are allowable based upon their dependence to claim 15.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

U.S. Patent 5,960,169 Styczinski discloses mirror/parity space allocation.

U.S. Patent 5,375,128 Menon et al. discloses unused space and parity.

U.S. Patent 6,985,995 Holland et al. discloses RAID data migration with error correction.

U.S. Patent 5,758,054 Katz et al. discloses data compression in RAID.

U.S. Patent 5,640,506 Duffy RAID with Reed/Solomon and sectors.

U.S. Patent 6,058,455 Islam et al. discloses RAID and Reed/Solomon coding.

U.S. Patent 6,282,671 Islam et al. discloses RAID 6 vs. RAID 5.

RAID: High-Performance, Reliable Secondary Storage discloses various RAID configurations and methods of applying error correction to storage data.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul Contino whose telephone number is (571) 272-3657. The examiner can normally be reached on Monday-Friday 9:00 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Scott Baderman can be reached on (571) 272-3644. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PFC
9/26/2007


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SUPERVISORY PATENT EXAMINER